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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/023,824	12/21/2001	Kwang-Eun Ahn	P-0294	3159

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EXAMINER	
FILE, ERIN M	
ART UNIT	**PAPER NUMBER**
2634	

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/023,824	KWANG-EUN AHN	
	Examiner	Art Unit	
	Erin M. File	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,7 and 11, 12, 16* is/are rejected.

7)☒ Claim(s) *4-6,8-10,13-15,17 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 11, 12, 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Wright et al.

Claim 11, Wright discloses an invention invention provides a wideband predistortion system and associated methods for compensating for non-linear characteristics of a power amplifier. The system preferably comprises a data structure in which each element stores a set of compensation parameters (preferably including FIR filter coefficients) for predistorting the wideband input signal (col. 2, lines 28-35). An Adaptive Control Processing and Compensation Estimator (ACPCE, 70) computes and eliminates the time delay difference between samples of the observed amplifier output and the input signal. The ACPCE compares the post distortion signal, $V_p(t)$ (or $V_f(t)$), to a reference signal, $V_m(t)$, to create an error signal, $V_{error}(t)$. The error signal is in turn used to adapt a pre-equalization structure (col. 39, lines 9-22). Once achieved the

ACPCE can accurately determine the adjustment required for the correction coefficients used by the Digital Compensation Signal Processing (DCSP, col. 8, lines 35-43).

Claim 12, inherits the limitations of Claim 11. Wright further discloses the ACPCE (fig. 1, 70) that computes and eliminates the time delay difference between samples of the observed amplifier output and the input signal (col. 39, lines 9-22). A reference signal Vm(t) is also disclosed (col. 29, line 48) which is used in the modeling of the distortion coefficients.

Claim 16, Wright discloses an Adaptive Control Processing and Compensation Estimator (ACPCE, 70) that computes and eliminates the time delay difference between samples of the observed amplifier output and the input signal. The ACPCE compares the post distortion signal, $V_p(t)$ (or $V_f(t)$), to a reference signal, $V_m(t)$, to create an error signal, $V_{error}(t)$. The error signal is in turn used to adapt a pre-equalization structure (col. 39, lines 9-22). Once achieved the ACPCE can accurately determine the adjustment required for the correction coefficients used by the Digital Compensation Signal Processing (DCSP, col. 8, lines 35-43).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Wright et al.

Claim 1, Davis discloses a predistortion unit (fig. 4, 21) that creates a predistorted in-phase and quadrature data signal. The signal is converted by digital-to-analog converters (23I, 23Q) and then up-converted by a quadrature mixer (26), effectively converting the digital signals output by the predistortion into an RF signal. A power amplifier (34) then amplifies the RF signal. Davis further discloses a quadrature demodulator (39), which down-converts an output signal of the power amplifier and uses analog to digital converters (38I, 38Q) to convert to a digital signal, and a reference signal generation unit (16I, 16Q). Davis discloses adaptive correction to the predistortion (col. 2, lines 36-40), but fails to disclose a high power amplifier modeling unit that produces coefficients, or controlling the characteristics of the predistortion adaptively using an error function. However, Wright discloses an amplifier measurement and modeling process for use in generating predistortion parameters.

Wright's invention includes predistortion (fig. 1, 52), analog to digital conversion (54), an up-conversion element (58), a power amplifier (60), a down-conversion element (66), and an analog to digital converter (68). Wright further discloses an Adaptive Control Processing and Compensation Estimator (ACPCE, 70) that computes and eliminates the time delay difference between samples of the observed amplifier output and the input signal. The ACPCE compares the post distortion signal, $V_p(t)$ (or $V_f(t)$), to a reference signal, $V_m(t)$, to create an error signal, $V_{error}(t)$. The error signal is in turn used to adapt a pre-equalization structure (col. 39, lines 9-22). Once achieved the ACPCE can accurately determine the adjustment required for the correction coefficients used by the Digital Compensation Signal Processing (DCSP, col. 8, lines 35-43). Because of the similarity in the implementation and purpose of the inventions of Davis and Wright, it would be obvious to one skilled in the art at the time of invention to incorporate Wright's coefficient generation and adaptive predistortion methods into Davis's invention.

Claim 2, inherits the limitations of Claim 1. Davis further discloses that the upconverting of the in-phase and quadrature signals consists of digital to analog converters (fig. 1, 23I, 23Q) and a quadrature mixer which provides modulation by mixing with an oscillator (28).

Claim 3, inherits the limitations of Claim 1. Davis further discloses a down-converting process including a quadrature demodulator (fig.1, 29, col. 5, lines 41-46) which demodulates the signal amplified by the power amplifier, and analog/digital converters

(38Q, 38I, col. 5, lines 51-53) that convert an analog signal, output from the demodulation unit to the digital signal output for further processing in calculating the adjustment of the predistortion signal (col. 5, lines 13-17).

Claim 7, Davis discloses a predistortion unit (fig. 4, 21) that creates a predistorted in-phase and quadrature data signal. The signal is converted by digital-to-analog converters (23I, 23Q) and then up-converted by a quadrature mixer (26), effectively converting the digital signals output by the predistortion into an RF signal. A power amplifier (34) then amplifies the RF signal. Davis further discloses a quadrature demodulator (39), which down-converts an output signal of the power amplifier and uses analog to digital converters (38I, 38Q) to convert to a digital signal. Davis discloses adaptive correction to the predistortion (col. 2, lines 36-40), but fails to disclose a high power amplifier modeling unit that produces coefficients, or controlling the characteristics of the predistortion adaptively using an error function. However, Wright discloses an amplifier measurement and modeling process for use in generating predistortion parameters. Wright's invention includes predistortion (fig. 1, 52), analog to digital conversion (54), an up-conversion element (58), a power amplifier (60), a down-conversion element (66), and an analog to digital converter (68). Wright further discloses an Adaptive Control Processing and Compensation Estimator (ACPCE, 70) that computes and eliminates the time delay difference between samples of the observed amplifier output and the input signal. The ACPCE compares the post distortion signal, $V_p(t)$ (or $V_f(t)$), to a reference signal, $V_m(t)$, to create an error signal,

$V_{error}(t)$. The error signal is in turn used to adapt a pre-equalization structure (col. 39, lines 9-22). Once achieved the ACPCE can accurately determine the adjustment required for the correction coefficients used by the Digital Compensation Signal Processing (DCSP, col. 8, lines 35-43). Because of the similarity in the implementation and purpose of the inventions of Davis and Wright, it would be obvious to one skilled in the art at the time of invention to incorporate Wright's coefficient generation and adaptive predistortion methods into Davis's invention.

5. Claim 1, is objected to because it uses the terms I and Q without properly defining the terms as in-phase and quadrature. Claim 1, is further objected to for the use of the acronym RF without proper definition.

6. Claims 4-6, 8-10, 13-15, 17, 18 are objected to as they depend upon rejected claims, but would be allowable if rewritten in independent form.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin M. File whose telephone number is (571)272-6040. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571)272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Erin M. File

2.10.2005

STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
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